

CLAIMS

1. A ladar system comprising:
a mode locked laser transmitter;
a receiver adapted to detect signals transmitted by the laser and reflected by an
object and
5 a signal processor for analyzing the signals.
2. The system of Claim 1 wherein said ladar system is a synthetic aperture
ladar system that further includes means for moving said ladar system while said
ladar system operates.
3. The invention of Claim 1 wherein the laser transmitter includes a laser and
means for mode locking the output thereof.
4. The invention of Claim 3 wherein the laser is an erbium-doped crystal laser.
5. The invention of Claim 4 wherein the laser is an erbium, ytterbium-doped
laser.
6. The invention of Claim 4 further including means for pumping the laser via
an optical fiber.
7. The invention of Claim 3 wherein the means for mode locking includes a
quantum well absorber.
8. The invention of Claim 3 wherein the means for mode locking includes an
acoustic crystal.

9. The invention of Claim 1 wherein the signal processor includes a range demultiplexer for organizing the signals into range bins.

10. The invention of Claim 9 wherein the signal processor further includes means for extracting a signal representing Doppler frequencies detected for each range bin.

11. The invention of Claim 10 wherein said means for extracting Doppler frequencies includes means for computing a frequency spectrum associated with each range bin.

12. The invention of Claim 11 wherein said means for computing a frequency spectrum includes a Fast Fourier Transform.

13. The invention of Claim 11 wherein said means for extracting Doppler frequencies further includes means for detecting centroids of said frequency spectrums.

14. The invention of Claim 10 wherein the signal processor further includes means for extracting a signal representing intensity of the signal detected for each range bin.

15. The invention of Claim 1 further including a local oscillator for generating a reference beam.

16. The invention of Claim 15 wherein said receiver combines said reflected signal with said reference beam.

17. A synthetic aperture radar system comprising:
a laser transmitter, the laser transmitter comprising:

- 5 a resonant cavity.
- a gain medium disposed with the cavity, and
- 5 a mode locking mechanism in communication with the medium for transmitting a mode locked signal from the cavity:
- a receiver adapted to detect signals transmitted by the laser and reflected by an object; and
- a signal processor for analyzing the signals.

- 18. A method for synthetic aperture ladar including the steps of:
- transmitting a series of mode locked laser pulses:
- receiving and detecting returns of the transmitted signals as the signals are reflected by an object; and
- 5 analyzing the signals to extract range and cross-range information.